Reactor Internals Removal

NASA determined that three horizontal beam tubes and two beryllium plates contained the highest amount of radioactivity and would be the first of the components to be removed.

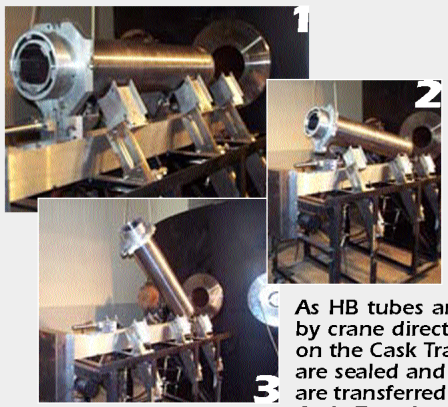
Horizontal Beam Tubes
Phase 1 & 1A

When the Reactor Facility was in operation, experiments were placed next to the reactor core through three horizontal beam tubes (HB tubes) - metal pipes roughly 14 inches in diameter and 7 feet long that ran through the vessel wall up to the core box.

To minimize the potential radiation dose to workers, most of the HB tube removal was performed remotely. Workers operated equipment while watching video monitors that showed the work area from various angles.

HB Tube Removal

- A specially designed air-activated table device guided the tube out from the side of the reactor into quadrant D.
- A custom-made bandsaw that automatically advanced by counter weight, made the cut through the HB tube. No worker was present during cutting.
- A crane lifted the cut piece of tube up 25-feet out of the quadrant and into a shielded liner.
- A stainless steel plug was bolted into the hole in the reactor vessel wall.



A section of HB tube being lifted out of quad.

Beryllium Plates
Phase 2

Two beryllium plates - having been used to reflect neutrons at the reactor core during operations - had become activated. During removal, special procedures are being used to prevent breaks in the plates that could cause the release of tritium - radioactive gas that is formed when beryllium is exposed to air.

Beryllium Plates Removal

Workers practice clamping beryllium during mock-up training.

- Workers will stand above the shrapnel shields on a work platform and look at video monitors to see inside the reactor.
- They will use articulated tooling to lower a special handling fixture into the reactor.
- A custom-designed clamp will be attached to the beryllium plates.
- Remote tools will be used to unbolt the plates from the core box.
- A crane will lift the plates out of the reactor and into a steel box.
- A remote shear will cut the rigging and clamp, which also will be placed in the box.
- A polyurethane substance will be injected into the box to surround, harden and immobilize the beryllium.
- The box will be placed into a liner and again injected with polyurethane.
- The liner will be placed into a cask and shipped to the Barnwell Disposal Facility.

As HB tubes and boxed beryllium plates are removed, they are placed by crane directly into a waste liner that is housed in a "dedicated cask" on the Cask Transfer System. When liners are full, they are sealed and lids are put in place. The liner and cask are transferred out of the containment vessel using the Cask Transfer System. A crane lifts the liner to the actual shipping cask on a truck. That cask is sealed and surveyed, then transported to the Barnwell, South Carolina Low-Level Radioactive Waste Disposal Facility where the liner and its contents are buried.

The first cask containing pieces of HB tubes was safely transported to the Barnwell, S.C. Disposal Facility in early September.

Internals Removal Below Core Region
Phase 3

In Phase 3 of segmentation, the removal of the reactor internals located around and below the core box (which was removed during Phase 2) will be removed and processed for packaging. When Phase 3 is complete, an empty reactor tank will remain.